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## (54) Safety seat for children

(57) A safety seat for children, for attachment in a use position to a preexisting support surface, in particular a car seat, comprises a seat shell 10, consisting of a seat surface 12, a back rest 11, and lateral bracing elements 13, a retainer element 14 which extends transversely above the seat surface, at a distance from it, and retainer arms 15 at the end regions of the retainer element. For greater comfort the bracing elements 13 are fitted with guides 16, each one of which holds one of the retainer arms 15, which are inserted into and can slide along the guides. The retainer arms 15 and the guides 16 have interacting latch means 17, 18 to fix the retainer arms in different insertion positions and to retain a child securely in the seat against forces arising from deceleration of a vehicle in which the seat is installed, and the latch means are releasable by a user for releasing the retainer arms 15 from the fixed position or for the complete removal of the retainer arms from the guides.

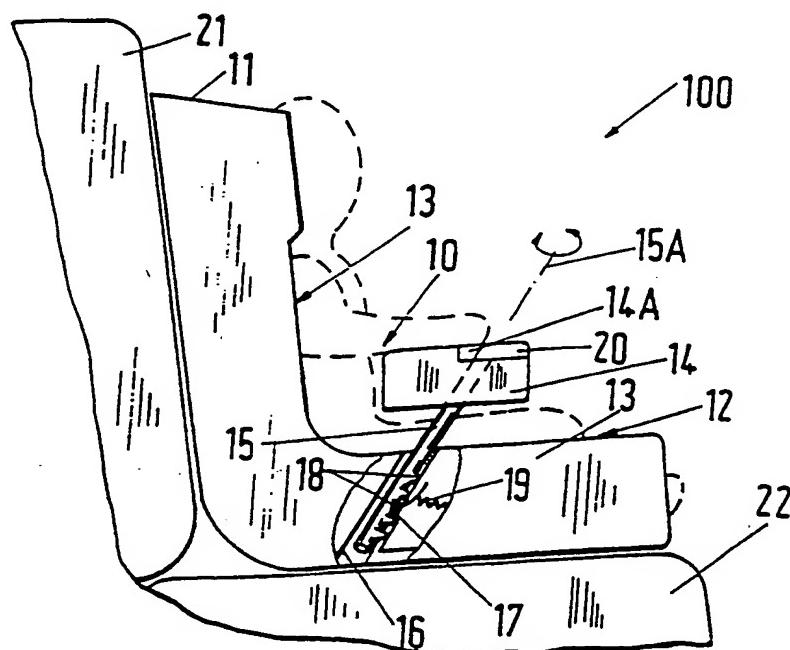


Fig.1

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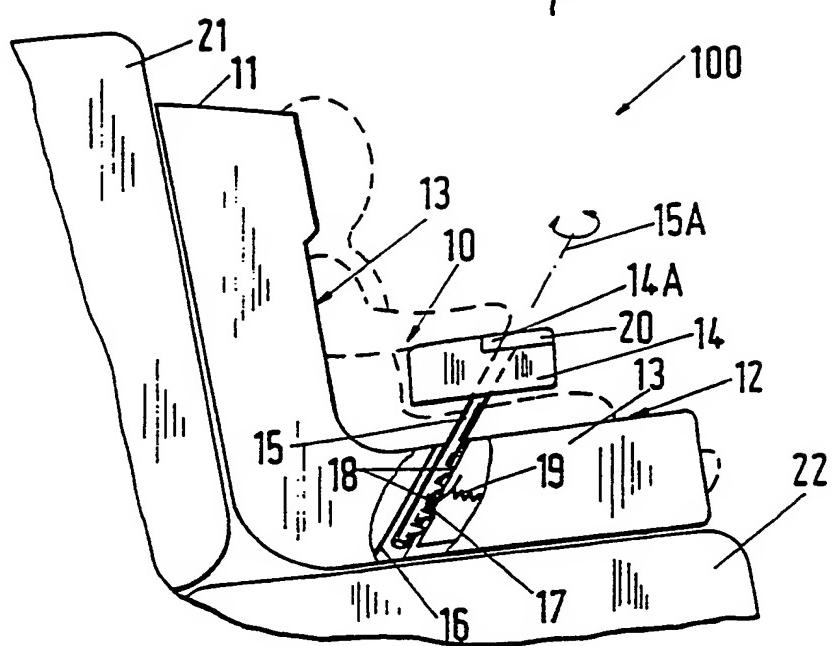


Fig.1

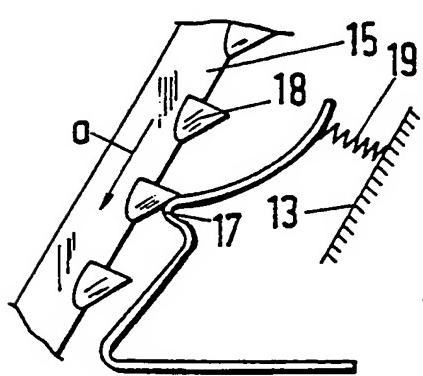


Fig.2a

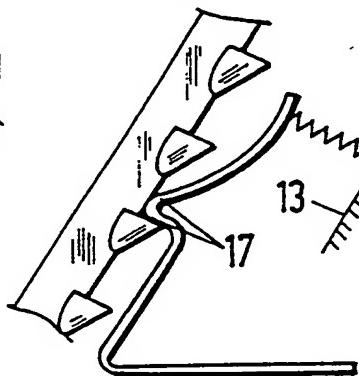


Fig.2b

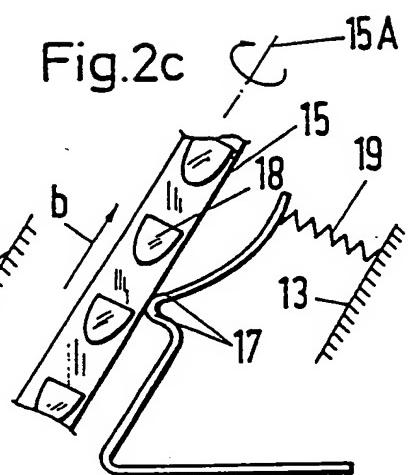


Fig.2c

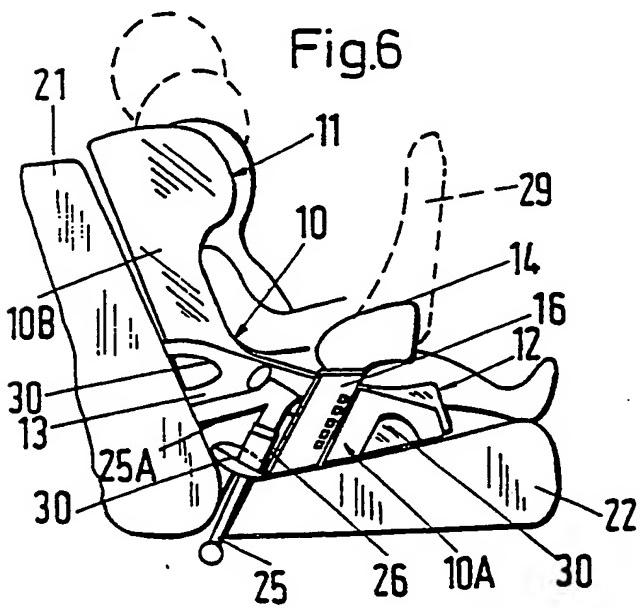


Fig.6

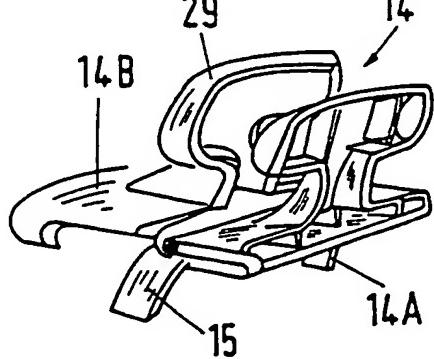
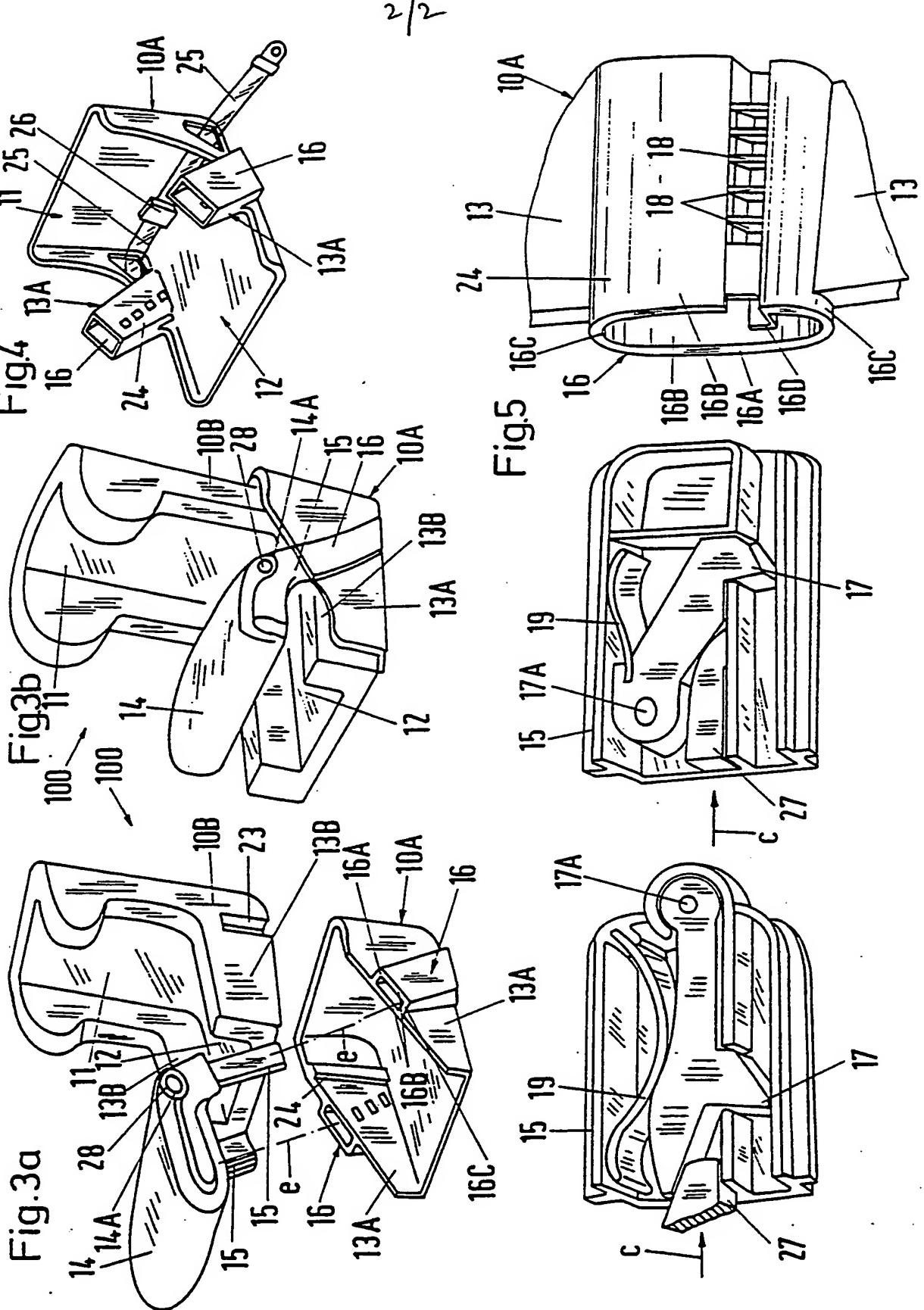


Fig.7



SAFETY SEAT FOR CHILDREN

The invention relates to a safety seat for children, for attachment to the seat of a car or similar part.

Safety seats for children should be easy to install in and remove from the vehicle; they should be such that they can be attached safely in the vehicle, used comfortably and designed optimally for the safety of the child.

German Patents Nos. 36 34 501 A1 and 38 17 232 A1 disclose child safety seats with a seat shell consisting of a seat surface and a back rest, and on both sides of the seat surface and the back rest, at least in the connecting area, lateral bracing elements, a retainer element which extends diagonally above the seat surface, at a distance from it, and for example, at the two ends of the retainer element, retainer arms which are arranged so that they are approximately parallel to each other and extend away from the retainer element approximately at a right angle. In both cases a U-clamp retainer element, which is located at the extremities of the side and can be swung around a horizontal axis, is insufficient to keep the child safely in the seat in the case of abrupt braking of the vehicle, in rear end

collision or similar accidents. For this reason additional suspender safety belts are provided with these known child seats. It is only these retainer belts which permit an adaptation to the body size of the child, while with retainer elements there is no such possibility for adaptation. In the two mentioned child seats the retainer element is swung inwards after the child has climbed into the seat, into a retaining position and they are locked in this position, against a return swing.

German Patent No. 36 643 587 A1 describes a child seat consisting of a back supportless seat section, attached in a removable manner to the seat of the vehicle, and a U-shaped safety element as the retainer section and held to the seat section by a belt which is under winding tension. In this manner the child, whose middle body section is in close contact with the safety element which acts like an automatic safety belt, is capable of moving together with the safety element. This known child safety seat neither offers the required safety nor does it permit a rapid and comfortable, simultaneous but also safe, attachment of the safety component to the seat section after the child has climbed in. In fact, the safety element must be positioned precisely with respect to the seat section so that it is even possible

to obtain some lateral hold with respect to the seat section.

Based on the preceding, the invention relates to the problem of increasing user comfort with the use of a safety seat for children, which can be attached as desired in a vehicle on a seat surface or similar part and which can be removed again. In this manner the acceptance of safety seats for children as such, but particularly the acceptance of the proper safety installation, that is the retainer element, should be increased.

The invention provides that the two lateral bracing elements of the seat shell are fitted with guides each one of which holds one of the retainer arms which are inserted and slid along guides, that the retainer arms and the guides have devices which work in cooperation for mutual latching of the retainer arm with the bracing elements in different insertion positions and for the reception of the retention forces for the user in the case of accelerated braking, as in a traffic accident, and that an unlatching installation is provided for unlatching the retainer arms from the latched position of the latching devices or for the complete removal of the retainer arms from the guides.

The advantages of a seat according to the invention include the fact that the child can conveniently climb into it and it is possible to attach the retainer element in a position which is correct for the child, conveniently, rapidly and safely, with substantial elimination of the risk of wedging parts of the child's clothing or even the child itself in it. A safety seat for children according to the invention is moreover such that it can be adjusted in the simplest manner with a single component, the retainer element, for adjustment to the body size of the child. One can therefore completely omit the use of an additional safety belt.

There are now different manners for practical implementation of the idea of the invention.

The unlatching of the retainer arms from the lateral walls of the seat shell is made possible, in a preferred embodiment, by turning a rod which has stop elements along its longitudinal direction and which can simultaneously function as a retainer arm or be provided at the retainer arm, or by an unlatching bolt into the retainer arm which is provided with a catch. In the first case, a catch which is braced against a spring pressure is provided, preferably, in the guide for the

retainer arm in the lateral wall of the seat shell. In the second case there is a corresponding stop element, preferably, in the retainer arm, while at the guide in the lateral wall of the seat shell, corresponding latches are provided. In both cases stop elements and latches can also be mutually exchanged.

The seat shell is preferably constructed as a rigid component with interior padding or in two parts with a rigid support part and a soft seat section, with attachment elements for attachment of the seat to the vehicle and guides for the retainer arms of the retainer element being provided in the support part.

In a preferred arrangement the guides are sloped towards the bottom at the lateral support elements of the seat shell at an angle with respect to the seat surface of approximately 30-60°, preferably approximately 40°, in the direction of the connection area between the seat surface and the back rest. The plane which extends over the two guides intersects with the seat shell preferably in the area of the seat surface. As a result, the seat can be adapted to the different body sizes of children of different ages or different sizes by varying the degrees of insertion of the retainer arm of the retainer element into the guides of the seat shell.

The above-mentioned and also the claimed components or those described in the embodiment examples, which are to be used according to the invention, are not subject to any particular exceptional conditions with respect to size, shape, material selection and technical design, so that it is possible to use without limitation the selection criteria used in the particular field of application.

Other details, characteristics and advantages of the subject of the invention can be understood from the following description referring to the accompanying drawings, in which:-

Figure 1 shows a first embodiment of a safety seat for children in side view, in a highly diagrammatic representation, partially cut away;

Figures 2a-2c show a latching/unlatching mechanism in an enlarged side view, in three working positions;

Figure 3 shows a second embodiment of the safety seat for children in a two-part design of the seat shell, in an exploded perspective view;

Figure 3b shows the same seat in the assembled state;

Figure 4 shows a seat according to Figure 3a and 3b, but with alternative form of a rigid support part;

Figure 5 shows a latching/unlatching mechanism for the retainer element for a seat according to Figure 3 or 4, in an enlarged detailed representation, with partial cut away, and a perspective drawing of two variations;

Figure 6 shows a further embodiment of the safety seat with a two-part seat shell, in a side view from the right; and

Figure 7 shows an alternative two-part retainer element, in perspective view.

Figure 1 shows a child safety seat for vehicles, indicated by general reference 100, consisting of a seat shell 10 with a back rest 11 and a seat surface 12 as well as, on both sides of the seat surface and the back rest, bracing elements in the form of bracing walls 13. The seat shell is designed as a rigid component which is padded on the interior side of the back rest, the seat surface and the bracing walls. A retainer element 14 also called safety element extends with a spacing above the seat shell and transversely to the same between the

two bracing walls 13, of which only the right one is visible in the figure. The retainer element 14 has a preferably rigid core which is padded on its outside. At the two ends of the retainer element, retainer arms 15 are attached, which are parallel to each other and approximately at a right angle to the longitudinal direction of the retainer element (in Figure 1, perpendicular to the plane of the picture), extending away from the retainer element diagonally down and to the rear.

The two lateral walls (bracing walls 13) of the seat shell 10 are fitted with guides 16 in the form of a longitudinal, straight, recess in each bracing wall, shaped so that the retaining arms 15 can be guided (inserted) from the top into the guides 16 and can be slid into them until the retainer element 14 has reached the desired position in front of the lower body and the upper thighs of the child who is already seated in the seat. If the retainer arms 15 are sufficiently long, the retainer element does not have to be removed to allow the child to climb into the seat, instead the free ends of the retainer arms 15 can remain inserted in the opening area of the guide 16.

In order to hold the child back in the seat with the necessary safety in the case of an impact, abrupt

braking or similar incident, the retainer arms 15 can be latched in an unlatchable manner within the guides 16. For this purpose a latch or detent element 17 which is attached to the seat shell and spring-loaded against it, projects into each guide 16, and the retainer arms 15 present along their length several consecutively arranged corresponding latch lugs or teeth 18. When the retainer arm 15 is inserted in the guide 16, the latch 17 yields against the pressure of a spring 19 away from the lugs 18. With such a catch mechanism, the depth of insertion of the retainer arms in guides 16 can be selected in accordance with the size of the child. In each one of the stop positions the retainer element can then no longer be withdrawn.

To unlatch the stop mechanism the retainer arms 15 must be rotated by approximately 90° around their axis 15A. For this purpose the retainer arms are in a bearing which permits rotation in the end parts of the retainer element 14, with a grip element 20 provided at the end of each retainer arm 15, which is freely accessible from the outside and permits the above-mentioned 90° rotation. To avoid wounds and unintentional actuation, the grip element 20 is located safely in a recess 14A of the retainer element 14, in a recessed part with protection against unintentional rotation.

Guide 16 in the bracing walls 13 and the rotation duct of the retainer arms 15 in the retainer element 14 are sloped towards the bottom at an angle of approximately 45° with respect to the seat surface in the direction of the connection area between the seat surface and the back rest, with the plane which extends over the retainer arms 15 being parallel to the retainer element 14 and intersecting the seat surface shortly before its transition into the back rest.

As shown in Figure 1, the child seat 100 is arranged on the back seat (back rest 21 and seat squab 22) of a passenger car, with the attachment of the child seat to the car seat being effected as illustrated, for example, in Figure 4 or 6. It is possible to use additional belts, which are attached to the fastening points for the safety belts of the car seats (see Figures 4 and 6) and it is also possible to effect the attachment by means of the safety belts themselves which is also known in itself.

Figure 2a-2c show a sequence of three typical working positions of the retainer arms and the latching and unlatching mechanism in an enlarged representation. Figure 2a shows how as a result of the insertion

(direction arrow a) of the retainer arms 15 in the guide 16 the latch 17 is pushed back, with compression of spring 19, by the lugs 18 of the support arms 15, until in each case a new latching stop position is reached, as shown, for example, in Figure 2b. Figure 2c shows how after a 90° rotation of the support arm 15 around its axis 15A, the lugs 18 on the retainer arm 15 with circular cross section reach a position which is outside the range of possible engagement of the latch element 17, so that the retainer arm 15 can be pulled up and out in its longitudinal direction.

In an alternative embodiment of a child safety seat according to Figures 3a and 3b the seat shell 10 is in two parts and it consists of a rigid support 10A and a softer seat section 10B. Both can be assembled by insertion to form a single construction unit using corresponding guide elements 23 and 24. The guides 16 are formed at the exterior side of the support part 10A as a box-shaped element forming a single part with the support part 10A and they have a rigidity-imparting effect like the guide elements 24.

In the alternative embodiment of the support part 10A according to Figure 4, the guides 16 are also box-shaped, but they extend in part into the interior

surface of the support part 10A and they can, to that extent, simultaneously function also as a guide element 24 for receiving a seat section 10B with corresponding guide elements (not shown in the drawing). In addition, Figure 4 shows how, by means of the corresponding attachment points in a vehicle, additional retainer belts 25 can be attached by means of a belt lock 26, making possible a safe and unproblematic attachment of the safety belts for children to car seats. Finally, Figure 4 shows that the bracing elements which form guides 16 and themselves are tubular bracing arms 13A and are provided at the two sides of the seat shell 10A, form a single piece with the seat shell. These bracing arms thus have, like the bracing walls 13 described before, a lateral bracing function for the safety seat.

Figure 5 shows, by way of example, how the guides 16 and retainer arms 15 can be provided for car seats for children according to Figures 3a-4. The guide 16 represented on the right in Figure 5 is in the shape of a box, for example approximately as shaped in Figure 3a/b or 4, and it has an open frontal end 16A and parallel lateral walls 16B, which in the area of two semicircular connection walls 16C form a single part with the bracing elements 13 or 13A of the support part 10a. A guide ledge 16D permits, in connection with latch lugs made of

lateral walls, an insertion and latching of the retainer arms 15 in different stop positions. In the middle and on the left of Figure 5, two alternative embodiments are represented of that end area of the retainer arm 15 located most forward in the direction of insertion. A latch element 17 which can pivot around a transverse axis 17A against the return force of a spring 19, can be brought by means of a push-button-actuated unlatching bolt 27 from the latching position into the unlatching position. In this process the unlatching bolt 27 must be pushed forwards by means of an actuation head 28 inside the hollow retainer arm 15 in the direction of arrow c. For this purpose an actuation button provided at the top retainer arm end is used.

An expert in synthetic plastics materials can, without any difficulty, construct the support part 10A and also the retainer arm 15 completely from such materials. In particular, it is also possible to use plastics materials with different properties, as has already been shown for the two-part seat shells according to Figures 3 and 4, and in Figure 6. The retainer element 14 can be constructed correspondingly. This is shown in Figure 7, according to which the retainer element 14 is made of two parts, a component 14A and a component 14B, with component 14A having the required rigidity and component

14B having padding properties, and the possibility exists for the retainer arm 15 to be constructed of a single part with component 14A.

The retainer element according to Figure 7 is particularly suited for the embodiment represented in dash lines in Figure 6 of the retainer element, which instead of a table-shaped form, as shown in solid lines, can also be constructed in connection with an impact body 29. The latter can provide additional safety under certain conditions for relatively small children in case of abrupt braking or rear end collisions and, if desired, it can be exchanged in its entirety for a table-shaped retainer element or it can be added as a retrofitted accessory for such a retainer element.

Figure 6 also shows that the support part 10, to achieve the best possible mechanical properties with lowest possible weight, can exhibit large perforated areas 30. In addition, Figure 6 shows that the retainer belt 25 engages advantageously at a point of the seat shell 10 which is approximately in the middle between the seat surface 12 and the back rest 11, on the connection line between these two parts, approximately in the area of the bisecting of the angle but as far away as possible so that belt locks which are attached like whips by

articulations to the car can also be used. For the simplest and safest force transfer, the retainer forces into the seat shell, a partial section 25A of the retainer belt 25 can be looped partially around the back support 11 or the seat surface 12.

## CLAIMS:

1. A safety seat for children, for attachment in a use position to a preexisting support surface, comprising a seat shell, consisting of a seat surface, a back rest, and on both sides of the seat surface and the back rest, at least in the connecting area thereof, lateral bracing elements,

a retainer element which extends transversely above the seat surface, at a distance from it, and retainer arms at the end regions of the retainer element, arranged so that they are approximately parallel to each other and extend away from the retainer element approximately at a right angle

characterized by the fact that the two lateral bracing elements of the seat shell are fitted with guides, each one of which holds one of the retainer arms which can slide along the guides,

the retainer arms and the guides have respective interacting means adapted to fix the retainer arms relative to the bracing elements in different relative positions and to retain a child securely in the seat against forces arising from deceleration of a vehicle in which the seat is installed, and the said interacting means are releasable by a user for releasing

the retainer arms from the fixed position or for the complete removal of the retainer arms from the guides.

2. A seat as claimed in claim 1 in which the fixing means comprise a latching mechanism, and unlatching means are provided for releasing the latching mechanism.

3. A safety seat according to claim 2 characterized by the fact that the unlatching of the retainer arms is achieved by rotating a rod fitted along its longitudinal direction with latch abutments, around its longitudinal axis.

4. A safety seat according to claim 2 characterized by the fact that the unlatching of the retainer arms is achieved by pushing in an unlatching bolt into retainer arm which has a catch or into the guide which has a catch.

5. A safety seat for children according to claim 1, 2, 3 or 4 characterized by the fact that the seat shell is constructed in the form of a rigid, internally padded, component.

6. A safety seat for children according to claim 1, 2, 3 or 4 characterized by the fact that the seat shell is constructed in two parts, with a rigid support part and a softer seat part, with attachment elements being provided for attachment of the seat to a vehicle and guides for the retaining arms of the retainer element being provided or engaging into the support part.
7. A safety seat for children according to any one of claims 1-6, characterized by the fact that the guides, at the bracing walls of the seat shell, are sloped downwards with respect to the seat surface by an angle of approximately 30-60°, in the direction of the connection part between the seat surface and the back rest.
8. A seat as claimed in claim 7 in which the plane extending over the guides intersects the seat shell in the area of the seat surface.
9. A seat as claimed in claim 7 or 8 in which the angle is approximately 40°C.
10. A seat as claimed in any of claims 1-9 in which the guides are hollow and the arms slide within them.

11. A child's safety seat substantially as herein described with reference to Figures 1-2c, Figures 3a and 3b, Figure 4, Figure 5, Figure 6 or Figure 7 of the accompanying drawings.

**Relevant Technical fields**

- (i) UK CI (Edition L ) A4L (LBEQ, LBBA/B, LCR, LBPC/E  
LBPC/E, LRLA/B/C/D/E)  
A4J: A3V (VRJ/A)  
B60N 2/28; B60R 22/14
- (ii) Int CI (Edition 5 )

**Search Examiner**

MR A ANGELE

**Databases (see over)**

- (i) UK Patent Office
- (ii)

**Date of Search**

15 JULY 1993

Documents considered relevant following a search in respect of claims ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	NONE	



Category	Identity of document and relevant passages	Relevant to claim(s)

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